

TOP INNOVATOR
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Introduction of BEAMS (Business Efficiency Acceleration for Medical Data Review with Spotfire®) Project

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Flow of This Session

- **Introduction**
 - What is the BEAMS Project?
 - Data Review in Clinical Trials
 - Issues
 - How to Solve the Issues
 - Development to Go-Live
- **How to implement**
 - Target Study
 - Data Flow
 - Customization for each study in Spotfire®
- **Sample report**
- **User feedback**
- **Future plans**

What is the BEAMS Project?

BEAMS = Business Efficiency Acceleration for Medical Data Review with Spotfire®



This is a project to support clinical science members in Chugai so that Medical Data Review can be performed efficiently and effectively using TIBCO® Spotfire®.

Data Review in Clinical Trials

Objective	Responsible Function	Method
Data Cleaning	<ul style="list-style-type: none"> DM CRA Study Management 	<ul style="list-style-type: none"> Site Monitoring eCRF screen review Edit checks
Individual Subject Data Review - Safety - PD - Efficacy	<ul style="list-style-type: none"> CRA Study Management Clinical Science Safety 	<ul style="list-style-type: none"> eCRF screen review Data review materials (including Spotfire® Webplayer)
Aggregate Data Review - Signal detection (Safety, PD, and efficacy) - Specific Purpose (Cohort transition, etc.)	<ul style="list-style-type: none"> Clinical Science Safety 	<ul style="list-style-type: none"> eCRF screen review Data review materials (including Spotfire® Webplayer) Exploratory Assessment with Spotfire

Medical Data Review

Review of Key Data requiring medical interpretation for safety/efficacy assessment and signal detection

Area requiring reinforcement

- **There are several issues to be solved in Exploratory Assessment with Spotfire® in Chugai**
 - Lack of clinical science members who can prepare aggregate data review materials
 - ➔ **1. Insufficient materials for medical data review**
 - Lack of Spotfire® templates versatile for any studies to perform exploratory assessments
 - ➔ **2. Take time for preparing medical data review materials**
 - ➔ **3. Incomplete quality of medical data review materials**

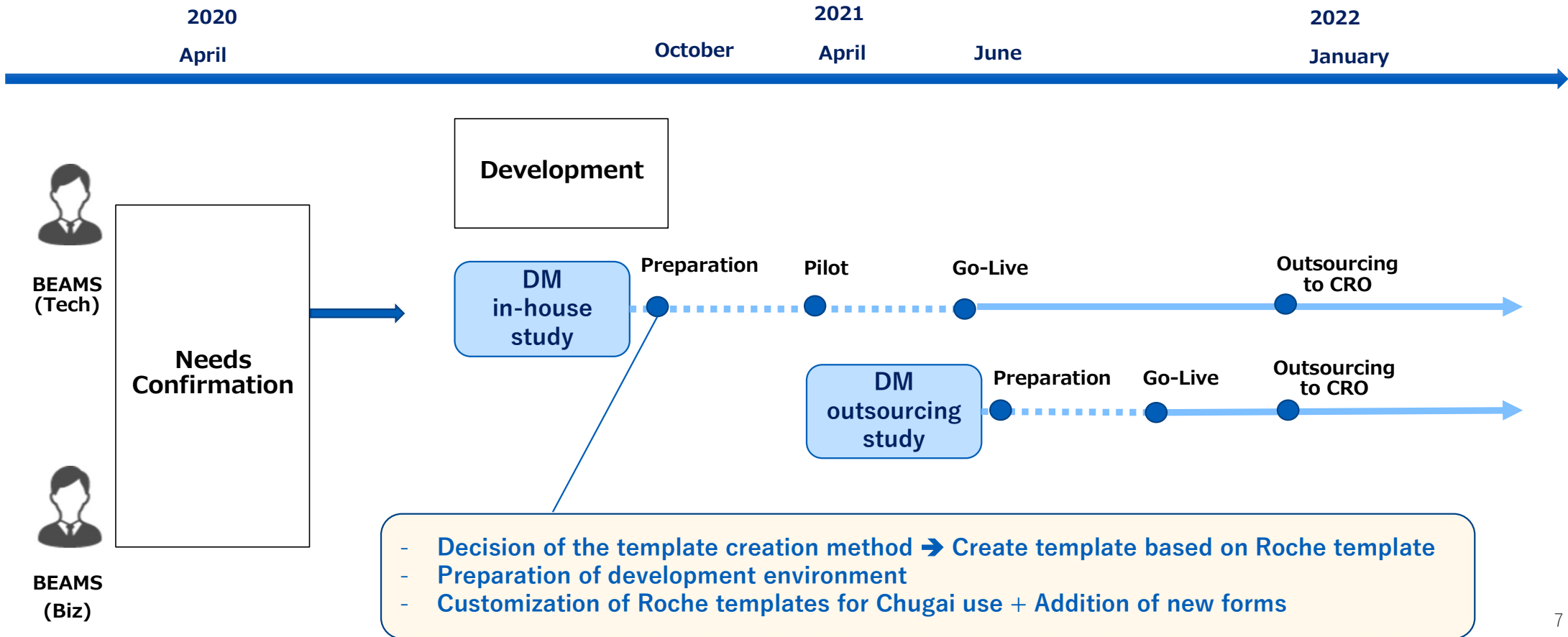
How to Solve the Issues

- **Create Spotfire® template** to prepare aggregate data review materials
- **Maintain the template**

- **Save time** for creating aggregate data review materials and customizing them for each study
- **Increase reviewers** by using the template
- Enable reviewers to perform aggregate data review **appropriately and in a short period of time**

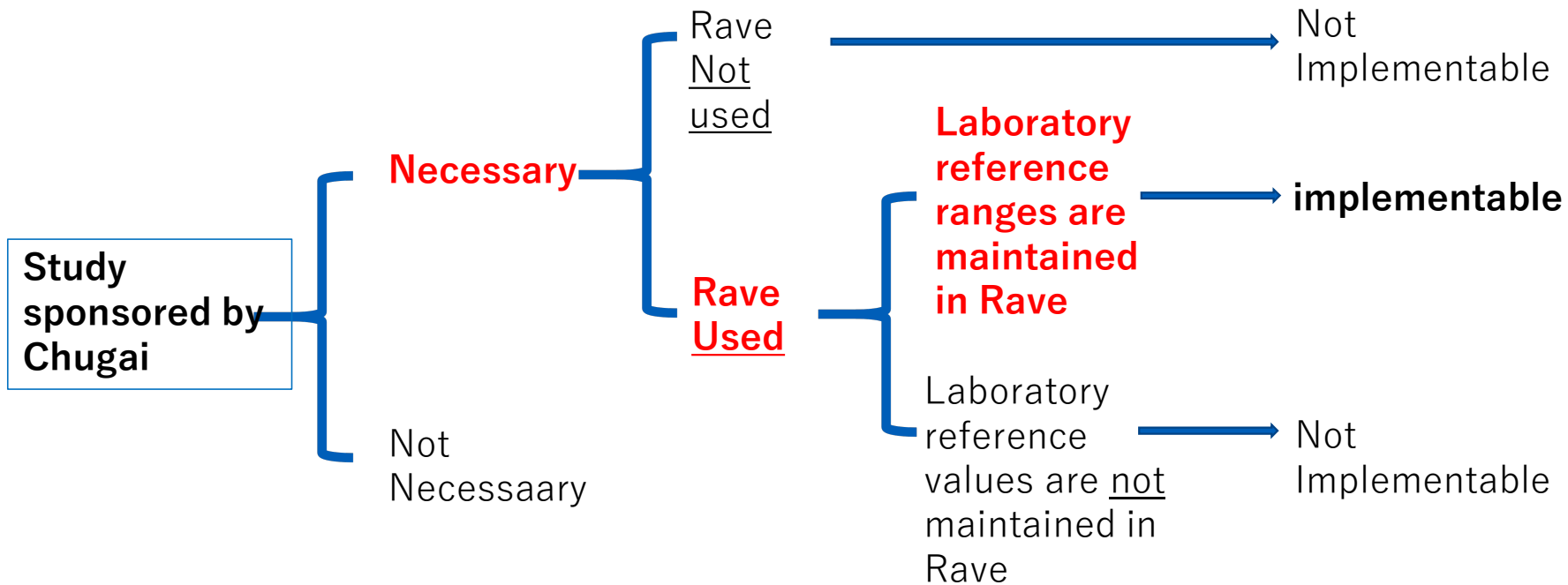
Detect safety and efficacy signals early, achieve PoC confirmation early, and it leads to **accelerate clinical development**

Development to Go-Live



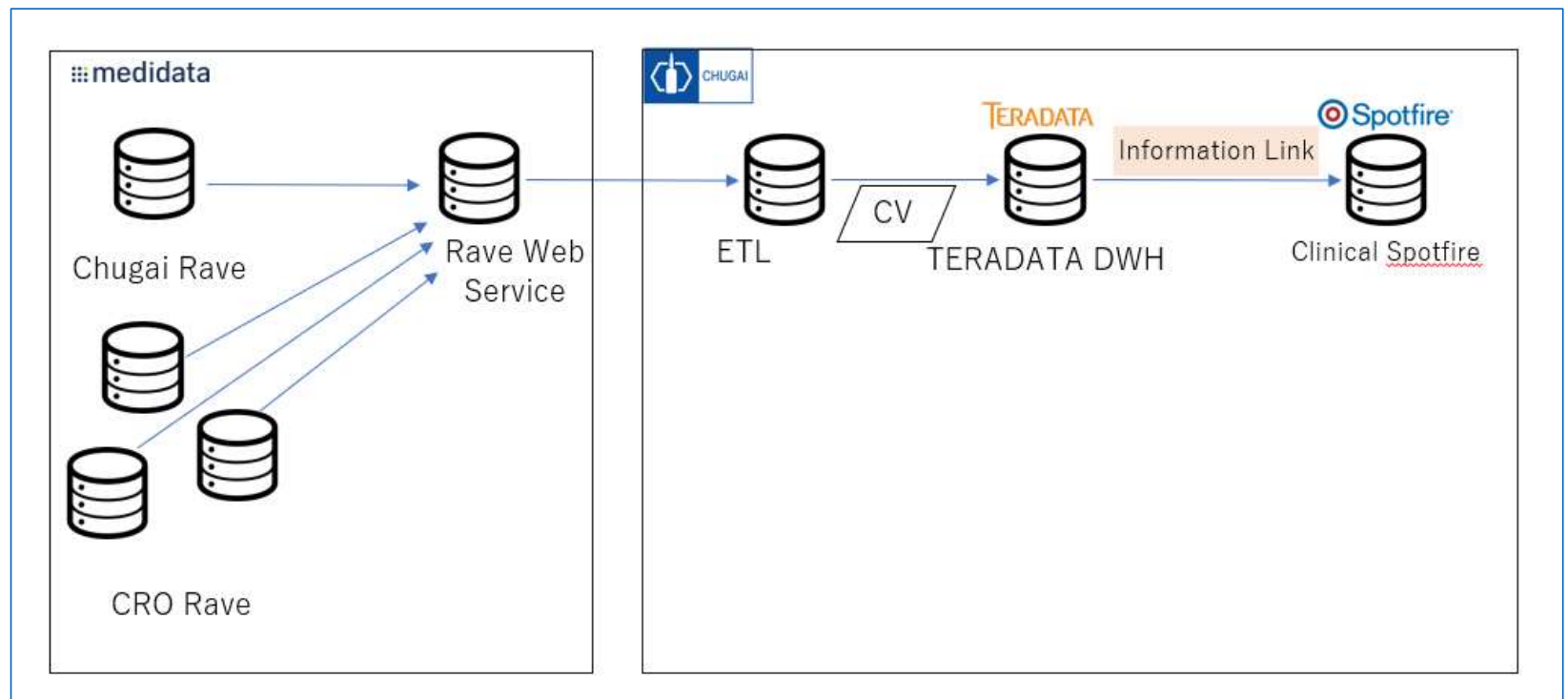
Target Study

Planned	CRO selection RFP
Needs for template use	What EDC used/ Laboratory Reference Ranges maintained in Rave or not



Data Flow

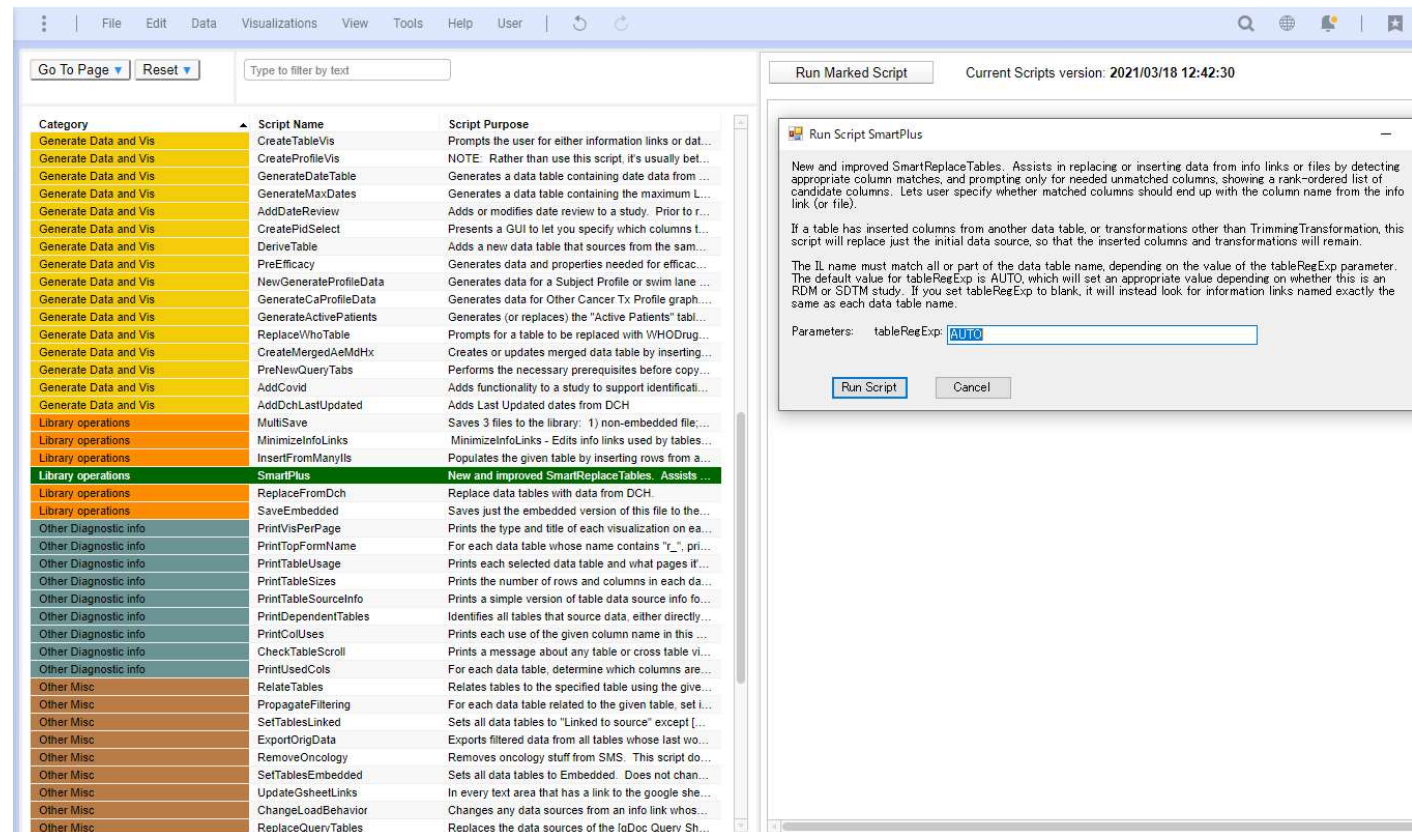
Retrieve EDC data daily with Rave Web Service and load data to Teradata



Customization for each study in Spotfire®

By embedding Python program, 70% to 80% of the construction work could be automated

- Data Mapping
- Rename Columns
- Set Column Width
- etc



The screenshot displays the Spotfire application interface. On the left, a 'Script Name' list is visible, categorized by 'Category'. The 'SmartPlus' category is highlighted in green, and the 'SmartPlus' script is selected. The 'Script Purpose' column provides details for each script. On the right, a 'Run Script SmartPlus' dialog box is open, showing the current scripts version as '2021/03/18 12:42:30'. The dialog contains a text area with instructions for using the 'SmartPlus' script, including a note about column matching and a parameter field for 'tableRegExp' set to 'AUTO'. 'Run Script' and 'Cancel' buttons are at the bottom of the dialog.

Category	Script Name	Script Purpose
Generate Data and Vis	CreateTableVis	Prompts the user for either information links or dat...
Generate Data and Vis	CreateProfileVis	NOTE: Rather than use this script, it's usually bet...
Generate Data and Vis	GenerateDataTable	Generates a data table containing date data from ...
Generate Data and Vis	GenerateMaxDates	Generates a data table containing the maximum L...
Generate Data and Vis	AddDateReview	Adds or modifies date review to a study. Prior to r...
Generate Data and Vis	CreatePidSelect	Presents a GUI to let you specify which columns L...
Generate Data and Vis	DeriveTable	Adds a new data table that sources from the sam...
Generate Data and Vis	PreEfficacy	Generates data and properties needed for efficac...
Generate Data and Vis	NewGenerateProfileData	Generates data for a Subject Profile or swim lane ...
Generate Data and Vis	GenerateCaProfileData	Generates data for Other Cancer Tx Profile graph...
Generate Data and Vis	GenerateActivePatients	Generates (or replaces) the "Active Patients" tabl...
Generate Data and Vis	ReplaceWhoTable	Prompts for a table to be replaced with WHODrug...
Generate Data and Vis	CreateMergedAeMdx	Creates or updates merged data table by inserting...
Generate Data and Vis	PreNewQueryTabs	Performs the necessary prerequisites before copy...
Generate Data and Vis	AddCovid	Adds functionality to a study to support identifi...
Generate Data and Vis	AddDchLastUpdated	Adds Last Updated dates from DCH
Library operations	MultiSave	Saves 3 files to the library: 1) non-embedded file...
Library operations	MinimizeInfoLinks	MinimizeInfoLinks - Edits info links used by tables...
Library operations	InsertFromManyIis	Populates the given table by inserting rows from a...
Library operations	SmartPlus	New and improved SmartReplaceTables. Assists ...
Library operations	ReplaceFromDch	Replace data tables with data from DCH.
Library operations	SaveEmbedded	Saves just the embedded version of this file to the...
Other Diagnostic info	PrintVisPerPage	Prints the type and title of each visualization on ea...
Other Diagnostic info	PrintTopFormName	For each data table whose name contains "r_", pri...
Other Diagnostic info	PrintTableUsage	Prints each selected data table and what pages it...
Other Diagnostic info	PrintTableSizes	Prints the number of rows and columns in each da...
Other Diagnostic info	PrintTableSourceInfo	Prints a simple version of table data source info fo...
Other Diagnostic info	PrintDependentTables	Identifies all tables that source data, either directl...
Other Diagnostic info	PrintColUses	Prints each use of the given column name in this ...
Other Diagnostic info	CheckTableScroll	Prints a message about any table or cross table vi...
Other Diagnostic info	PrintUsedCols	For each data table, determine which columns are...
Other Misc	RelateTables	Relates tables to the specified table using the give...
Other Misc	PropagateFiltering	For each data table related to the given table, set i...
Other Misc	SetTablesLinked	Sets all data tables to "linked to source" except [...]
Other Misc	ExportOrigData	Exports filtered data from all tables whose last wo...
Other Misc	RemoveOncology	Removes oncology stuff from SMS. This script do...
Other Misc	SetTablesEmbedded	Sets all data tables to Embedded. Does not chan...
Other Misc	UpdateGsheetLinks	In every text area that has a link to the google she...
Other Misc	ChangeLoadBehavior	Changes any data sources from an info link whos...
Other Misc	ReplaceQueryTables	Replaces the data sources of the IdDoc Query Sh...

Report List

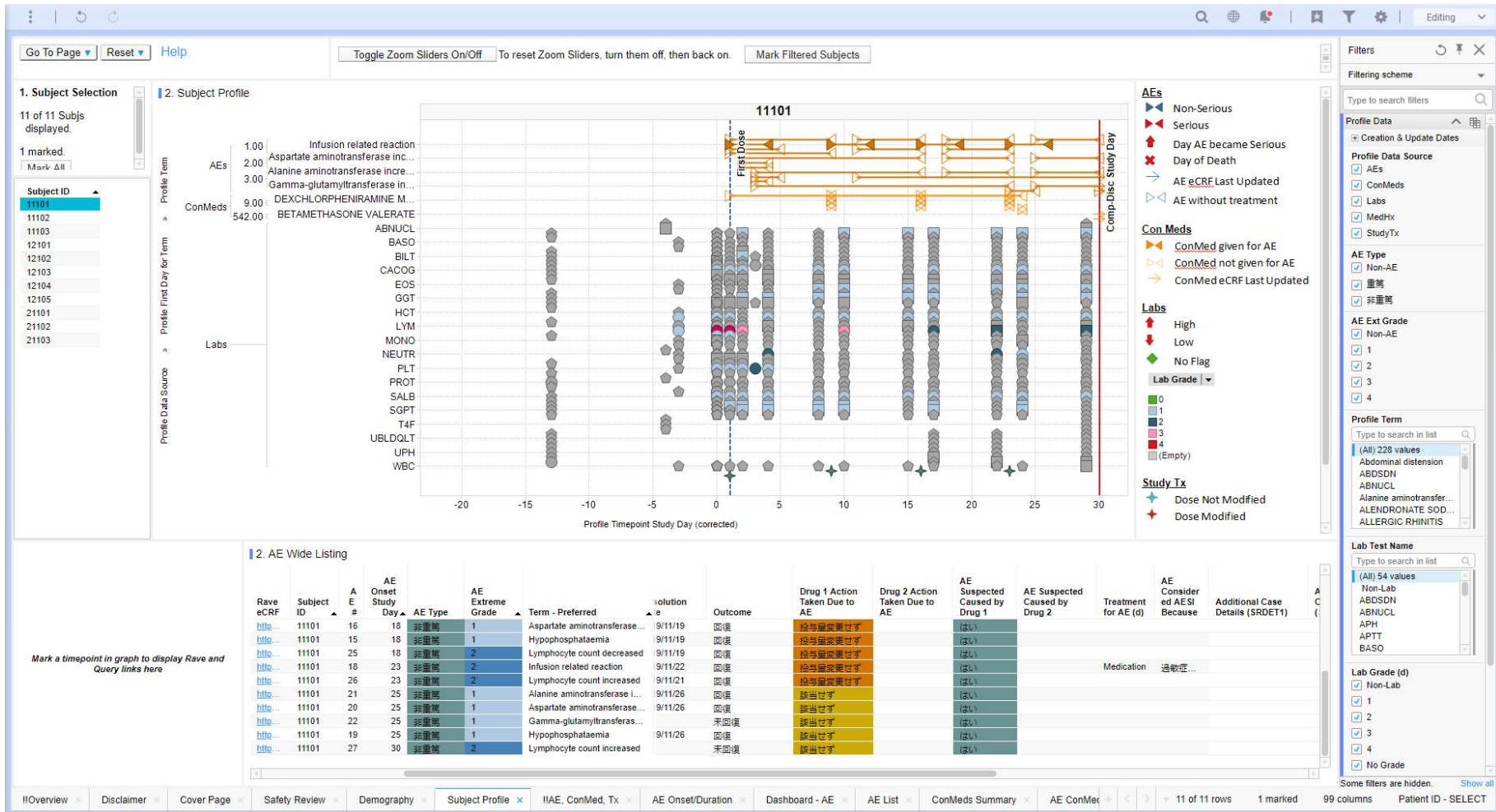
BEAMS prepares forms for safety, test values, investigational drugs, etc.

* Regarding to Oncology, BEAMS prepares reports related to efficacy.

Category	No	Template Name
Overview	1	Cover Page
	2	Safety Review
	3	Demography
	4	Subject Profile
AE, ConMed, Tx	5	AE Summary
	6	AE Onset/Duration
	7	Dashboard - AE
	8	AE List
	9	<u>ConMeds</u> Summary
	10	AE ConMed <u>MedHx</u>
	11	Study <u>Tx</u> List
	12	Study Tx Graphs
	13	AE >> Labs
Labs	14	Lab Listing
	15	Labs 1 (Multiple <u>Subj</u> /Test)
	16	Labs 2 (Multiple Tests/Subj)
	17	Labs 3 (<u>GradeSummary</u>)
	18	Labs 4 (Box Plot)
	19	Labs 5 (Spaghetti)
	20	<u>Hy's Law</u> Labs
	21	<u>Hy's Law</u> Labs (<u>xBL</u>)

Category	No	Template Name
Vitals, ECG, <u>Discon</u>	22	Vitals 1 (By <u>Subj</u>)
	23	Vitals 2 (Aggregated)
	24	Vitals 3 (Outliers)
	25	ECG
	26	Discon
	27	<u>Discon</u> 2
	28	Discon (w/ Summary Table)
	Oncology	29	ONC- Other Ca Tx Listing
30		ONC- Other Ca Tx Profile
31		RECIST
32		ONC-Tumor Assessment List
33		ONC-Tumor Assessment Lists & Graphs
34		ONC-Tumor Assessment Graphs
35		ONC-Sym Deterioration
36		ECOG
37		Survival
38		Death <u>att</u> to PD
Others	39	DLT
	40	DLT (2)
	41	Spider plot (New)
	42	Waterfall plot (New)

Report : Subject Profile



Report : AE Summary

Go To Page ▼ Reset ▼ Help
Color By: AE Extreme Grade ▼

1. AE System Organ Class Summary

A subject that has reported AEs that are mapped to multiple SOC will be counted once in each SOC.

System Organ Class Term	Grade 1	Grade 2	Grade 3	Grade 4
Investigations	10	10	9	11
Injury, poisoning and procedural complications	5	11	0	0
Gastrointestinal disorders	5	5	0	0
Metabolism and nutrition disorders	7	4	0	0
Skin and subcutaneous tissue disorders	7	0	0	0
Blood and lymphatic system disorders	0	3	0	0
General disorders and administration site conditions	4	0	0	0

2. Overall AE Summary of Preferred Terms

Note: Subjects that reported multiple AEs mapped to the same Preferred Term will be counted once within Preferred Terms.
Note: % of subjects are based on subjects having received at least one dose of the study treatment.

Term - Preferred	# of Subj	% of Subj
Aspartate aminotransferase...	4	36.4%
White blood cell count decre...	2	18.2%
Alanine aminotransferase in...	1	9.1%
Lymphocyte count increased	1	9.1%
Neutrophil count decreased	1	9.1%

2. AE Wide Listing

Rave eCRF	Subject ID	AE #	AE Onset Study Day	AE Type	AE Extreme Grade	Term - Preferred	atim	Onset Date	AE Resolution Study Day	Resolution Date	Outcome	Drug 1 Action Taken Due to AE	Drug 2 Action Taken Due to AE	AE Suspec Caused Drug 1
http...	21103	13		非重篤	4	Lymphocyte count decreased	E COUNT...	2020/7/20		2020/7/22	回復	投与量変更せず	投与量変更せず	はい
http...	21103	14		非重篤	4	Lymphocyte count decreased	COUNT ...	2020/7/28		2020/7/30	回復	投与量変更せず	該当せず	はい
http...	21103	7		非重篤	4	Lymphocyte count decreased	E COUNT...	2020/7/13		2020/7/16	回復	投与量変更せず	投与量変更せず	はい
http...	21103	16		非重篤	4	Lymphocyte count decreased	E COUNT...	2020/8/04		2020/8/06	回復	該当せず	該当せず	はい

Demography × Subject Profile × !!AE, ConMed, Tx × AE Summary × AE Onset/Duration × Dashboard - AE + < > ▼ 389 ローの 389 49 をマーキング 178 個のカラム AE with AESI

Report : Labs (Multiple Subject/Test)

Go To Page | Reset | Help
Select Lab: SGOT

1. Scatter Plot of Selected Lab Results (with converted ANC, ALC) - All Subjects

2. Subject Selection

1 of 11 Subjs marked on page Labs 1 (Multiple Subj/Test) displayed.

1 marked.

Mark All

Subject ID: 12103

3. Lab Results Over Time - Subject Level

12103 » SGOT (U/L)

3. Lab Listing

Subject ID	Lab Test	Study Day of Sample Collection	Sample Collection Date	Instance Name	Lab Grade (ANC ALC Convert)	Worst Grade for Subj/Lab	Lab Range Flag	Test Result (Char)	Original Test Res... (Num)	Lab Test Unit
12103	SGOT	30	04SEP2020	FOLLOW_UP_28	1	3	H	43	43	U/L
12103	SGOT	0	05AUG2020	CYCLE1_DAY1	3	3	H	27	27	U/L
12103	SGOT	0	05AUG2020	CYCLE1_DAY1	3	3	H	27	27	U/L
12103	SGOT	0	05AUG2020	CYCLE1_DAY1	3	3	H	25	25	U/L
12103	SGOT	0	05AUG2020	CYCLE1_DAY1	3	3	H	27	27	U/L
12103	SGOT	1	06AUG2020	CYCLE1_DAY2	3	3	H	158	158	U/L
12103	SGOT	93	06NOV2020	FOLLOW_UP	1	3	H	37	37	U/L
12103	SGOT	2	07AUG2020	CYCLE1_DAY3	3	3	H	276	276	U/L
12103	SGOT	3	08AUG2020	UNSCHEDULED	3	3	H	166	166	U/L
12103	SGOT	4	09AUG2020	CYCLE1_DAYS	2	3	H	97	97	U/L
12103	SGOT	6	11AUG2020	UNSCHEDULED	3	3	H	177	177	U/L
12103	SGOT	7	12AUG2020	UNSCHEDULED	3	3	H	191	191	U/L
12103	SGOT	9	14AUG2020	UNSCHEDULED	3	3	H	179	179	U/L
12103	SGOT	12	17AUG2020	UNSCHEDULED	1	3	H	81	81	U/L
12103	SGOT	16	21AUG2020	UNSCHEDULED	1	3	H	41	41	U/L
12103	SGOT	54	28SEP2020	UNSCHEDULED	3	3	H	24	24	U/L

3. AE Narrow Listing

Rave eCRF	Subject ID	Term - Preferred	AE Onset Study Day	AE Type	AE Extreme Grade	Term - Verbatim
http...	12103	Aspartate aminotransferase...	6	2	3	AST INCREASED
http...	12103	Blood bilirubin increased	9	3	2	BLOOD BILIRUBIN I...
http...	12103	Platelet count decreased	5	1	2	PLATELET COUNT D...
http...	12103	Haematuria	14	47	2	HEMATURIA
http...	12103	Hypomagnesaemia	8	1	1	HYPOMAGNESEMIA
http...	12103	Blood creatinine increased	10	3	2	CREATININE INCRE...
http...	12103	Pruritus	12	4	1	PRURITUS
http...	12103	Infusion related reaction	1	1	2	INFUSION RELATED ...
http...	12103	Lymphocyte count decreased	3	1	4	LYMPHCYTE COUNT...
http...	12103	Alanine aminotransferase i...	7	2	2	ALT INCREASED
http...	12103	Rash	11	4	1	SKIN ERUPTION
http...	12103	Tumour pain	4	2	2	TUMOR PAIN
http...	12103	White blood cell count decr...	2	1	3	WHITE BLOOD CELL...
http...	12103	White blood cell count decr...	13	7	2	WHITE BLOOD CELL...

Some filters are hidden. [Show all](#)

Labs 1 (Multiple Subj/Test) | Labs 2 (Multiple Tests/Subj) | Labs 3 (GradeSummary) | Labs 4 (Box Plot) | Labs 5 (Spaghetti) | Hy's Law Labs | Hy's Law Labs (xBL) | IIVitals, ECG, Discon | Vitals 1 (By Subj) | 11 of 11 rows | 1 marked | 99 columns | Patient ID - SELECT

Report : AE >> Lab

1. AE System Organ Class Summary

Color by: AE Ext...
 1 (Blue), 2 (Green), 3 (Pink), 4 (Red)

2. Subject Selection

4 of 11 Subjs marked on page AE >> Labs displayed.

1 marked
Mark All

Subject ID
 12103
 12105
 21101
 21102

3. Lab Results per Subject

12103 » SGOT (U/L)

3. AE Narrow Listing

RAVE eCRF	Subject ID	Term - Preferred	AE #	Onset Study Day	AE Type	AE Extreme Grade	Term - Verbatim	Onset Date	AE Resolution Study Day
https://...	12103	Aspartate aminotransferase increased	6	2	非重篤	3	AST INCREASED	2020/8/06	55
https://...	12103	Blood bilirubin increased	9	3	非重篤	2	BLOOD BILIRUBIN I...	2020/8/07	7
https://...	12103	Platelet count decreased	5	1	非重篤	2	PLATELET COUNT D...	2020/8/05	10
https://...	12103	Haematuria	14	47	非重篤	2	HEMATURIA	2020/9/20	6
https://...	12103	Hypomagnesaemia	8	1	非重篤	1	HYPOMAGNESEMIA	2020/8/05	3
https://...	12103	Blood creatinine increased	10	3	非重篤	2	CREATININE INCRE...	2020/8/07	7
https://...	12103	Pruritus	12	4	非重篤	1	PRURITUS	2020/8/08	17
https://...	12103	Infusion related reaction	1	1	非重篤	2	INFUSION RELATED ...	2020/8/05	6
https://...	12103	Lymphocyte count decreased	3	1	非重篤	4	LYMPHOCYTE COUNT...	2020/8/05	5
https://...	12103	Alanine aminotransferase i...	7	2	非重篤	2	ALT INCREASED	2020/8/06	17
https://...	12103	Rash	11	4	非重篤	1	SKIN ERUPTION	2020/8/08	10

3. Lab Listing

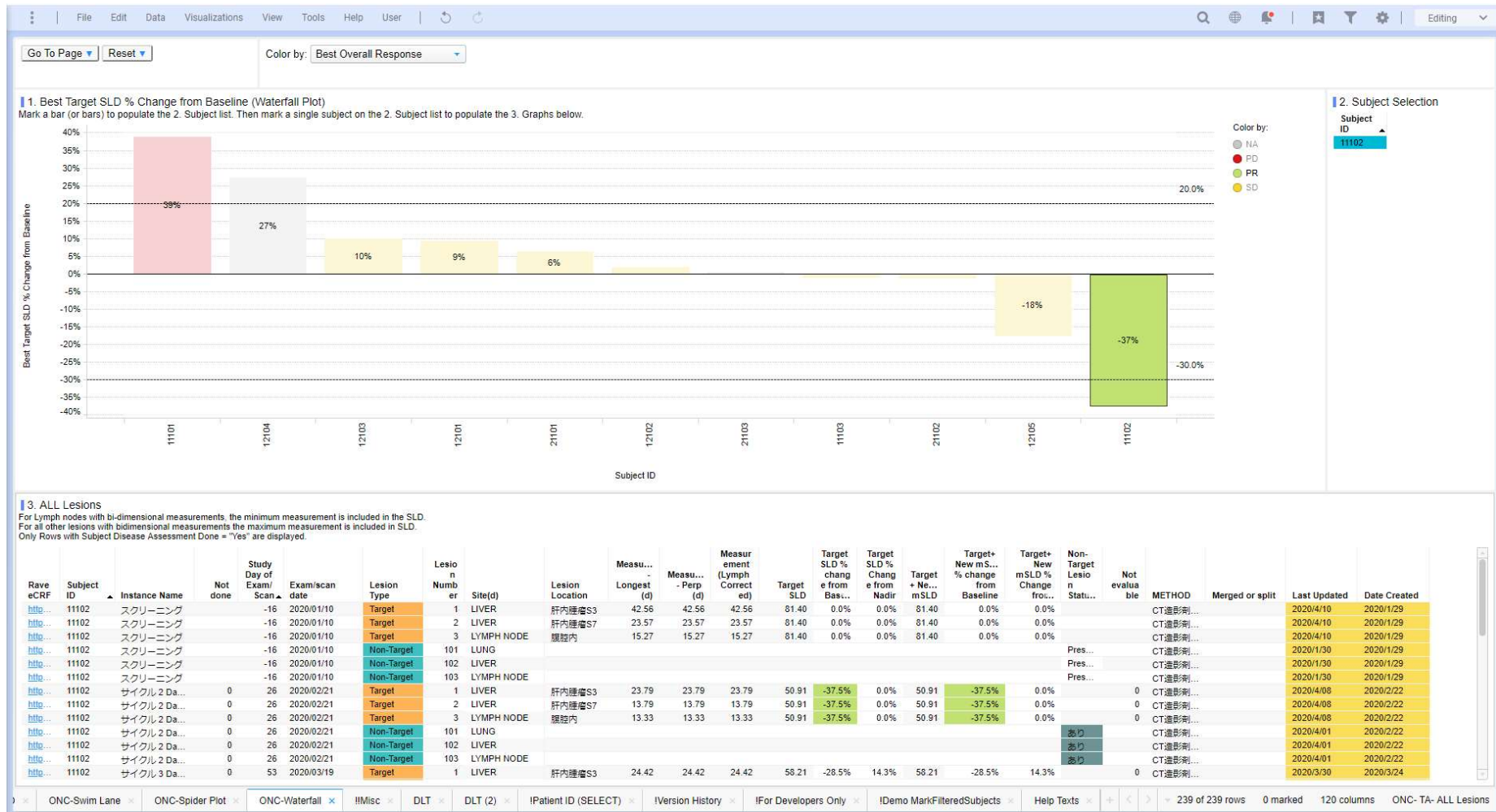
Subject ID	Lab Test	Study D... of Sample Collection	Original LLN	Original ULN	Standa... Value	Standard Units	WBC per s... visit	Cal Standard Result (ANC ALC Convert)	Standard Unit (ANC ALC Convert)
12103	ABSDN	30	0	6	...	...	5.4	...	...
12103	ABSDN	93	0	6	...	...	4.6	...	...
12103	ABSDN	-5	0	6	...	...	4.5	...	...
12103	ABNUCL	30	0	39.9999	...	...	5.4	...	...
12103	ABNUCL	93	0	39.9999	...	...	4.6	...	...
12103	ABNUCL	-5	0	39.9999	...	...	4.5	...	...
12103	APH	30	106	322	105.71...	U/L	5.4	105.7142857142	U/L
12103	APH	0	106	322	61.785...	U/L	1.9	61.78571428571	U/L
12103	APH	0	106	322	65	U/L	1.9	65	U/L
12103	APH	0	106	322	63.928...	U/L	1.9	63.92857142857	U/L
12103	APH	0	106	322	63.571...	U/L	1.9	63.57142857142	U/L
12103	APH	1	106	322	100.71...	U/L	2	100.7142857142	U/L
12103	APH	93	38	113	78.362...	U/L	4.6	78.3628318584	U/L
12103	APH	2	106	322	106.78...	U/L	2.6	106.7857142857	U/L
12103	APH	3	106	322	190	U/L	2.8	190	U/L
12103	APH	4	106	322	211.705...	U/L	3.6	211.7057142857	U/L
12103	APH	6	106	322	236.92...	U/L	2.8	236.9285714285	U/L
12103	APH	7	106	322	230.71...	U/L	2.8	230.7142857142	U/L
12103	APH	9	106	322	195.71...	U/L	2.8	195.7142857142	U/L
12103	APH	12	106	322	166.78...	U/L	2.8	166.7857142857	U/L
12103	APH	16	106	322	143.92...	U/L	2.8	143.9285714285	U/L
12103	APH	-5	106	322	78.571...	U/L	4.5	78.57142857142	U/L
12103	APTT	30	23	40	27.1	sec	5.4	27.1	sec
12103	APTT	0	23	40	29.3	sec	1.9	29.3	sec

Adverse Event Grade Change

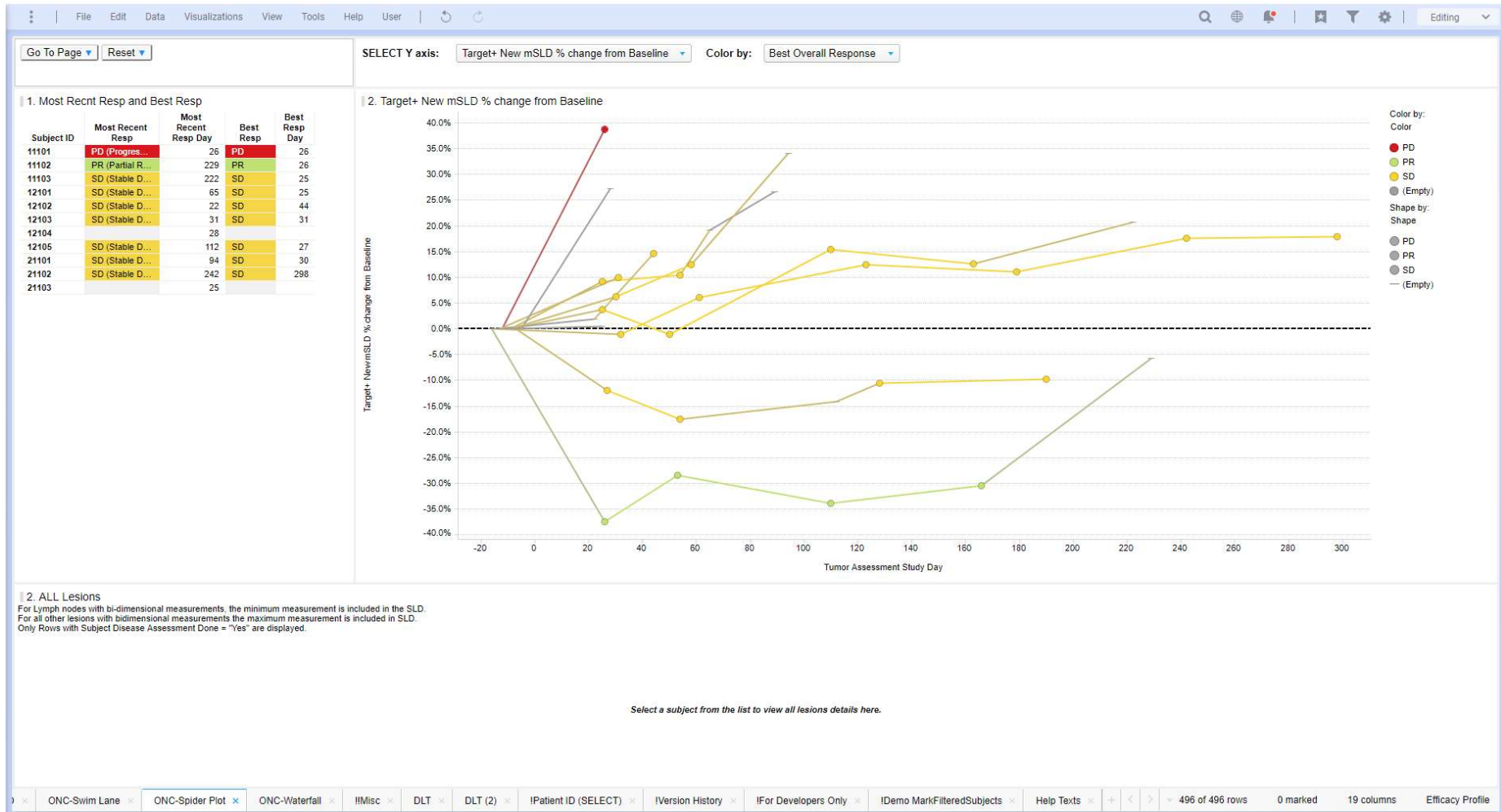
RAVE eCRF	Subject ID	Record Position	Adverse event	NCI CTCAE grade	AE intensity or grade change date	Study Day of AE Change Date	Study Day of Onset Date	Onset date
https://...	42103	1	COUGH	1	2018/5/14	283.625	266.625	2018/4/27
https://...	42103	1	SORE THROAT	1	2018/5/07	276.625	266.625	2018/4/27

AE >> Labs | Lab Listing | Labs 1 (Multiple Subj/Test) | Labs 2 (Multiple Tests/Subj) | Labs 3 (GradeSummary) | Labs 4 (Box Plot) | Labs 5 (Spaghetti) | Hy's Law Labs | Hy's Law Labs (xBL) | IIVitals, E+ < > - 389 of 389 rows - 4 marked 178 columns AE with AESI

Report : Onc-Waterfall



Report : Onc-Spider Plot



User feedback

Individual subject data review

- Although the number of subjects in the XXX study was not so large, it was easy to identify the data to be checked because the list clearly shows which subjects continued or discontinued the study (e.g., safety review). The larger the sample size, the more useful it is.
- Although the amount of data such as the date of administration of investigational product, AEs, concomitant drugs, and test values was large, they were summarized in a visually comprehensible manner, allowing for deep interpretation in each case. For example, there was a patient who developed liver function test abnormal approximately 300 days after the start of investigational product, and other test values, AEs, vitals, concomitant drugs, tumor assessments, test values in other patients, etc. at that time point could be easily confirmed and reviewed.

User feedback (cont.)

Aggregated data review

- AEs, lab values, and vitals are presented in aggregated graphs and tables from various perspectives (Example: Scatter plots, bar charts, box plots, Spaghetti, Hy's law, etc. by grade for lab values). In particular, XXX is a drug in which abnormal liver function values are markedly observed after administration of investigational product. When these graphs are put together, a signal of abnormal liver function values is clear, and everyone was able to recognize it again in the same manner. I felt that it was easy to notice new signals.
- The efficacy-related forms are not only a list of RECIST evaluation but also other forms such as Swimlane, Spider Plot, and Waterfall Plot, which are visually clear and easy to see, and therefore easy to confirm while comparing with safety data.

Future plans



Synchronize with Roche to update template

- Share information with Roche contacts and obtain updated information on the Roche template

Use Roche CRF template

- Currently, 25% of the requirements are from Chugai, and 75% are based on Roche's CRF template.
- By using the exact same CRF template as Roche, the development effort of the BEAMS Form will be greatly reduced.
 - > It is expected that more than 90% of settings can be implemented in Python

INNOVATION BEYOND IMAGINATION